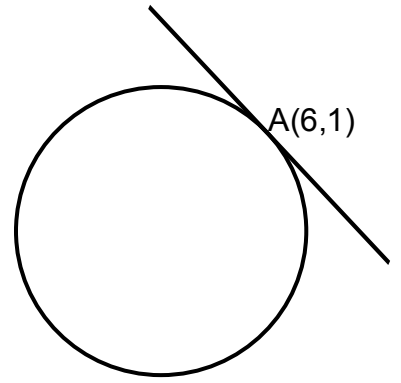


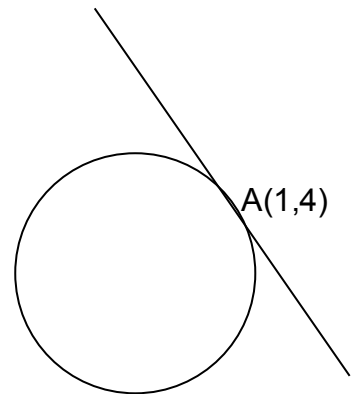
Higher Maths Supported Study 9

1. The diagram shows the circle $x^2 + y^2 - 6x + 4y - 5 = 0$.
Find the equation of the tangent to this circle at the point A(6,1).



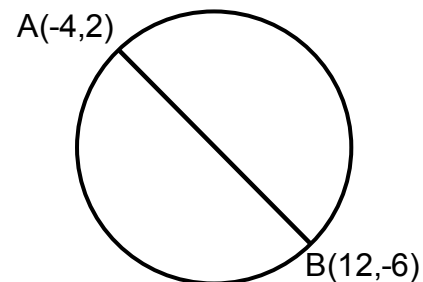
2. Find the equation of the tangent to the circle $x^2 + y^2 - 10x - 33 = 0$ at the point P(-2, -3).

3. (a) Find the equation of the tangent to the circle $x^2 + y^2 + 10x - 2y - 19 = 0$ at the point A(1,4).
(b) Show that this tangent is also a tangent to the parabola $y = 2x^2 - 10x + 14$ and find the point of contact.



4. (a) A circle has centre (6,5) and radius $\sqrt{17}$. Show that the equation of this circle can be written in the form $x^2 + y^2 - 12x - 10y + 44 = 0$
(b) Show that the line $y = 4x - 2$ is a tangent to this circle and find the point of contact.

5. A is the point (-4,2) and B is (12,-6). Find the equation of the circle which has AB as a diameter.



6. Two circles have equations

$$x^2 + y^2 + 4x + 16y - 60 = 0 \quad \text{and} \quad x^2 + y^2 - 8x + 4y + 12 = 0$$

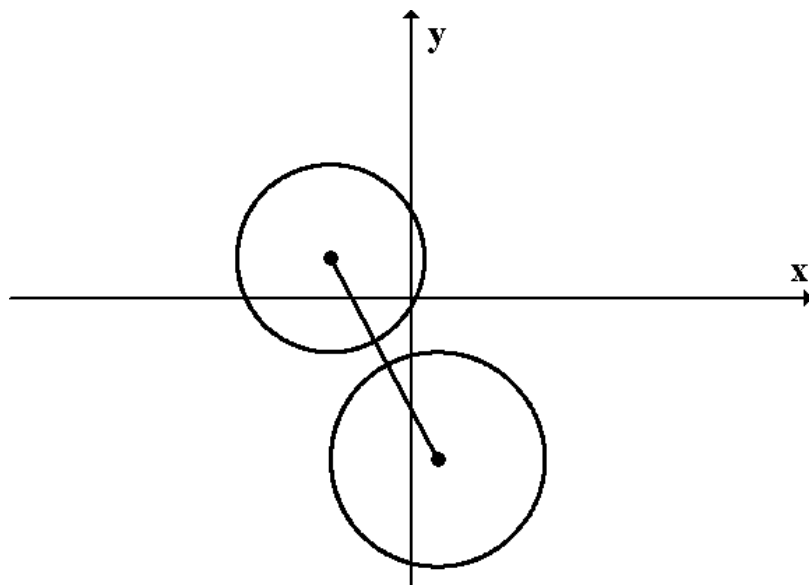
Show that these circles touch at a single point.

7. Two circles have equations

$$x^2 + y^2 + 12x - 6y - 4 = 0$$

and $(x - 2)^2 + (y + 12)^2 = 64$

Calculate the smallest distance between these circles.

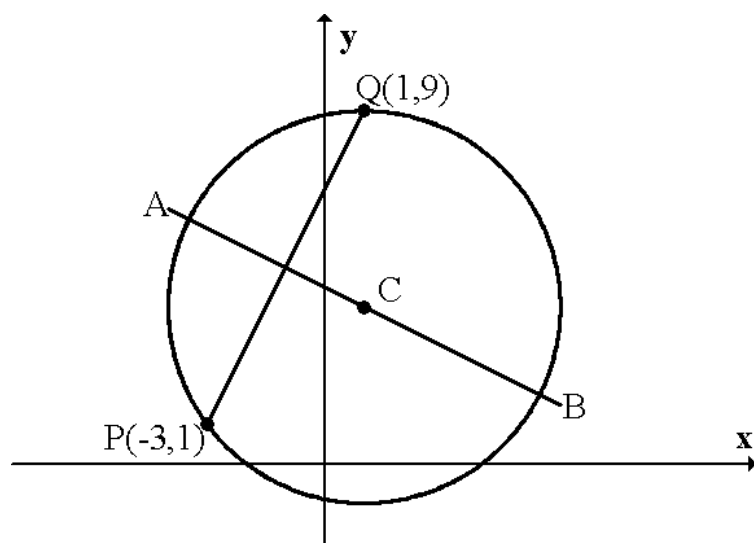


8. (a) Find the equation of AB, the perpendicular bisector of the line joining the points P(-3,1) and Q(1,9).

(b) C is the centre of a circle passing through P and Q. Given that QC is parallel to the y-axis, determine the equation of the circle.

(c) The tangents at P and Q intersect at T.

- (i) Write down the equation of the tangent at Q.
- (ii) the coordinates of T.



9. (a) Show that the point P(5,10) lies on circle C_1 with equation

$$(x + 1)^2 + (y - 2)^2 = 100.$$

(b) PQ is a diameter of this circle, as shown. Find the equation of the tangent at Q.

(c) Two other circles, C_2 and C_3 , touch circle C_1 at Q. The radius of each of these circles is twice the radius of C_1 .

Find the equations of circles C_2 and C_3 .

